

**BEFORE THE  
FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, D.C. 20554**

In the Matter of	)	
	)	
Annual Report and Analysis of	)	WT Docket No. 07-71
Competitive Market Conditions with	)	
Respect to Commercial Mobile Services	)	

**REPLY COMMENTS OF ERICSSON INC**

To:     The Commission

Barbara Baffer, Vice President,  
Public Affairs & Regulations  
Allison Ellis, Director Regulatory Policy  
Director, Spectrum Policy  
Ericsson Inc  
1634 I Street, N.W., Suite 600  
Washington, D.C. 20006-4083  
Telephone:   (202) 824-0102  
Facsimile:   (202) 783-2206

Elisabeth H. Ross  
Birch, Horton, Bittner & Cherot  
1155 Connecticut Avenue, N.W.  
Suite 1200  
Washington, D.C. 20036  
Telephone: (202) 659-5800  
Facsimile: (202) 659-1027

May 22, 2007

## SUMMARY

Since the 11<sup>th</sup> CMRS Competition Report, the U.S. mobile broadband market has experienced robust growth. The deployment of advanced technologies has caused mobile data services and broadband deployment to expand rapidly. Today, applications supporting enhanced data capabilities, video, and mobile broadband access services are mainstream, and form the foundation of competition among carriers. Advanced technologies within the 3rd Generation Partnership Project (“3GPP”) family, like WCDMA and HSPA, have fueled this growth. These technologies provide efficient, cost effective 3G mobile broadband via seamless upgrades to existing GSM networks.

In the coming years, the 3GPP technology family will continue to be a strong competitor in the evolution of the U.S. mobile broadband market. Each technology upgrade in the GSM evolution track, which includes WCDMA, EDGE, HSPA, HSPA-E, and LTE, has important operational and performance attributes that will continue to support vibrant CMRS competition.

Specifically, HSPA, when combined with HSPA-E, offers higher data rates than any competing technology. Both HSPA’s extensive deployment to date and its network design, have created global economies of scale, which reduce the capital investment necessary to build out an HSPA network and make it a strong, competitive technology. Moreover, with HSPA, networks are well primed for the evolution to LTE, which promises even higher data rates and enhanced performance. It is for these reasons that the GSM family of technologies will continue to drive vibrant competition in the U.S. CMRS marketplace.

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**I. INTRODUCTION.**

Ericsson Inc (“Ericsson”) submits these reply comments in response to the Federal Communications Commission’s (“FCC” or “Commission”) *Public Notice*, released April 6, 2007.<sup>1</sup> The FCC seeks data and information in order to evaluate the state of competition among CMRS providers for its *Twelfth CMRS Competition Report*.

In these comments, Ericsson supplies data on, and an overview of, the CMRS industry’s deployment of mobile broadband technologies to date. In addition, Ericsson describes the advantages of the 3GPP technology family (the next generation of GSM advanced technologies), which includes Enhanced Data Rates for Global Evolution (“EDGE”), High Speed Packet Access (“HSPA”), HSPA-Evolved (“HSPA-E”), and Long Term Evolution (“LTE”). Ericsson then compares these technologies to other mobile broadband technologies deployed in the U.S. Specifically, Ericsson highlights that:

- The U.S. broadband market has expanded rapidly since the *Eleventh CMRS Competition Report*, and GSM and WCDMA networks continue to experience strong growth as providers rollout HSPA;

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<sup>1</sup> See *WTB Seeks Comment on CMRS Market Competition*, Public Notice, WT Docket No. 07-71, DA 1652 (rel. Apr. 6, 2007), at 3 (“*Public Notice*”).

- WCDMA and HSPA have fueled robust mobile broadband growth because they permit operators to upgrade existing GSM networks easily and in a cost-effective manner;
- WCDMA and HSPA networks enable carriers to offer a wide range of 3G applications, including advanced data, video, and mobile broadband access services; and
- HSPA mobile technology differs from WiMAX<sup>2</sup> in several major respects, including that: HSPA has already achieved far greater commercial deployment and economies of scale; HSPA networks require significantly less capital investment to build-out; and HSPA (combined with HSPA-E) offer higher data rates than WiMAX at each of the technologies' evolutionary stages.

Based on the foregoing and as discussed in greater detail below, the 3GPP family of technologies, especially HSPA and its evolution technologies, have distinct performance and efficiency advantages and will be a vibrant competitor to other technologies in the U.S. mobile broadband progression to 4G technology.<sup>3</sup>

## **II. THE DEPLOYMENT OF NEWER TECHNOLOGIES HAS CAUSED MOBILE DATA AND BROADBAND DEPLOYMENT TO RAPIDLY EXPAND.**

The deployment of advanced network technologies, such as WCDMA, EDGE, and HSPA, among others, has spurred a period of significant growth in the wireless market. The higher data rates associated with these technologies have enabled carriers to introduce myriad 3G services and applications to consumers hungry for them. Consumers are increasingly able to use their mobile devices wherever and whenever they

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<sup>2</sup> Throughout this document Ericsson uses the term “WiMAX” or “mobile WiMAX” to refer to IEEE 802.16e-2005.

<sup>3</sup> 4G technology, or “Systems Beyond IMT-2000,” is informally defined as “systems capable of supporting mobile data rates of 100 Mbps or higher and nomadic rates of 1 Gbps or higher.” *See* Framework and Overall Objectives of the Future Development of IMT-2000 and Systems Beyond IMT-2000 (Question ITU-R-229/8), Recommendation ITU-R M. 16745, at 11. 2003. 18 May 2007 <[www.ieee802.org/18/Meeting\\_documents/2007\\_Jan/R-REC-M.1645-0-200306-I!!MSW-E.doc](http://www.ieee802.org/18/Meeting_documents/2007_Jan/R-REC-M.1645-0-200306-I!!MSW-E.doc)>.

wish. Due to the strong competition in the CMRS market, consumers also have a diversity of offerings from which to choose.

**A. Robust Growth Characterizes the Mobile Broadband Market.**

Since the Commission's last CMRS competition report, the mobile broadband market has expanded dramatically. In the *Eleventh CMRS Competition Report*,<sup>4</sup> the Commission observed that 3G subscriber rates in the U.S. lagged behind European rates.<sup>5</sup> Then, the percentage of mobile subscribers on 3G networks in the U.S. was just 1.9%, compared with 7.7% in the U.K.<sup>6</sup> However, the picture was not entirely bleak. Cingular launched the first commercial HSDPA<sup>7</sup> network in October 2005.<sup>8</sup> As the Commission noted, the U.S. commercial launch of an HSDPA network occurred prior to that of Europe, which may have given the U.S. an edge in mobile broadband deployment.<sup>9</sup> Since then, the number of HSPA networks has increased worldwide to over 100.<sup>10</sup>

Today, GSM and WCDMA networks are still growing in the United States and abroad. Analysts expect continued strong growth throughout 2007. This growth is fueled by ongoing HSPA rollouts in the United States and elsewhere. The introduction of HSPA has increased network traffic volumes and, remarkably, HSPA data traffic has

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<sup>4</sup> See *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, WT Docket No. 06-17, Eleventh Report, 21 FCC Rcd 10947 (2006) ("*Eleventh CMRS Competition Report*").

<sup>5</sup> See *id.* at 11025, ¶ 201.

<sup>6</sup> *Id.*

<sup>7</sup> HSPA now combines under one umbrella High Speed Downlink Packet Access ("HSDPA") and Enhanced Uplink ("HSUPA").

<sup>8</sup> Fitchard, Kevin, *Cingular Turns on HSDPA in Three Markets*. 18 Oct. 2005. Telephony Online. 18 May 2007. <[http://telephonyonline.com/wireless/marketing/cingular\\_hsdpa\\_markets\\_101805/](http://telephonyonline.com/wireless/marketing/cingular_hsdpa_markets_101805/)>.

<sup>9</sup> See *Eleventh CMRS Competition Report*, 21 FCC Rcd 11025, ¶ 202.

<sup>10</sup> See *More Than 100 3G HSDPA Commercial Networks Worldwide*. 4 Apr. 2007. 3G.co.uk. 18 May 2007 <<http://www.3g.co.uk/PR/April2007/4532.htm>>; see also Networks, HSPA Mobile Broadband Today. 2007. GSM Association. 18 May 2007 <<http://hspa.gsmworld.com/networks/default.asp>>.

*doubled* in the last six months in HSPA markets.<sup>11</sup> Operators continue to upgrade their networks to advanced technologies, like HSPA, and to prepare for the integration of advanced technologies, like LTE, into their networks.

**B. Providers Offer a Multitude of Applications Using New Mobile Broadband Technologies.**

HSPA networks enable carriers to combine traditional mobile telephony with an array of advanced services and applications and thereby expand their multi-service capabilities. Third-generation (“3G”) services on HSPA networks include video telephony, mobile TV streaming, advanced data applications, fixed PSTN-equivalent telephony, and mobile broadband access. Consumers can now transmit photos, surf the web, perform on-line banking, listen to Internet radio, and download music using HSPA mobile broadband technology. Previously, mobile data applications were “tethered” to hotspots, but with the expansion of mobile broadband networks, consumers now have near-ubiquitous connectivity.

**III. THE 3GPP TECHNOLOGY FAMILY WILL BE A STRONG COMPETITOR IN THE U.S. MOBILE BROADBAND PROGRESSION TO 4G TECHNOLOGY.**

The 3GPP technology track builds on the extensive GSM networks deployed today. With more than 2.4 billion subscribers, GSM is the most widely deployed wireless technology, creating a vast network foundation.<sup>12</sup> Each of the advanced technology upgrades in the GSM evolution path, EDGE, HSPA, and LTE, has specific performance advantages. In addition, each upgrade is not only easily introduced into existing GSM networks, but also can be achieved in a cost-efficient manner. These

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<sup>11</sup> See Ericsson First Quarter Report 2007, at 5. 26 Apr. 2007. Ericsson Inc. 18 May 2007 <[http://www.ericsson.com/ericsson/investors/financial\\_reports/2007/3month07.shtml](http://www.ericsson.com/ericsson/investors/financial_reports/2007/3month07.shtml)>.

<sup>12</sup> Comments of 3G Americas, WT Docket No. 07-71 (filed May 7, 2007), at 2 (“3G Americas Comments”).

significant advantages help to ensure that the 3GPP family of technologies will be a robust competitor in the U.S. mobile broadband progression to 4G technology.

#### **A. EDGE**

EDGE combines efficient technology and a simple GSM infrastructure upgrade to provide an important complement to high-speed WCDMA and HSPA networks. With 196 networks commercially launched, EDGE gives operators a cost-effective way to offer high-performance mobile data service over GSM. As noted by 3G Americas, a majority of the 60 GSM operators in the U.S. have upgraded to EDGE technology.<sup>13</sup> Additionally, a number of enhancements to EDGE (“EDGE Evolution”) have been standardized in 3GPP. These simple software upgrades to existing EDGE networks provide peak data rates of 1 Mbps, which produces mobile Internet connections comparable to 500 kbps ADSL service.

#### **B. HSPA**

HSPA is a state-of-the-art mobile broadband technology that has already achieved high performance and economies of scale. It combines High Speed Downlink Packet Access (“HSDPA”) and Enhanced Uplink (“HSUPA”). HSPA currently allows potential data rates of up to 14 Mbps in the downlink direction. Further improvement in HSPA data rates of up to 40 Mbps in the downlink direction is expected in the near future.<sup>14</sup> HSPA technology is deployed globally more than any other 3G technology - it is incorporated into over 107 networks worldwide in over 55 countries, with an additional

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<sup>13</sup> 3G Americas Comments at 3.

<sup>14</sup> See Figure 1, *infra*, part III.C.



82 HSPA networks planned or in deployment.<sup>15</sup> Over 95 commercial operators use HSPA networks, while only 55 use EV-DO.<sup>16</sup>

HSPA is designed to allow for easy, cost-efficient upgrades and flexible use. With HSPA, operators can seamlessly upgrade their GSM and WCDMA networks via a software introduction to further broaden the reach of their networks, which already serve over 2 billion subscribers worldwide. HSPA's extensive deployment has resulted in global economies of scale, which significantly reduce the cost of both HSPA build-outs and HSPA-capable consumer devices. Moreover, when networks are upgraded, GSM and WCDMA customers in non-upgraded networks are not stranded; HSPA devices readily work on GSM and WCDMA networks. As a result, HSPA technology not only ensures that consumers have nationwide coverage for voice services, but also that consumers can access the best available data services as well.

HSPA also has a clearly-defined and easily-adopted evolutionary path. By 2008, HSPA-Evolved ("HSPA-E") technology, which is a fully backwards compatible evolution of HSPA, will be commercially available. HSPA-E combines 16 QAM uplink and 64 QAM downlink modulation with 2x2 MIMO (multiple input multiple output) technology. This next step in the GSM evolution will enable potential data rates of up to 40 Mbps downlink with even greater spectrum efficiency.<sup>17</sup> Thus, HSPA-E increases the mobile broadband capabilities for operators even further.

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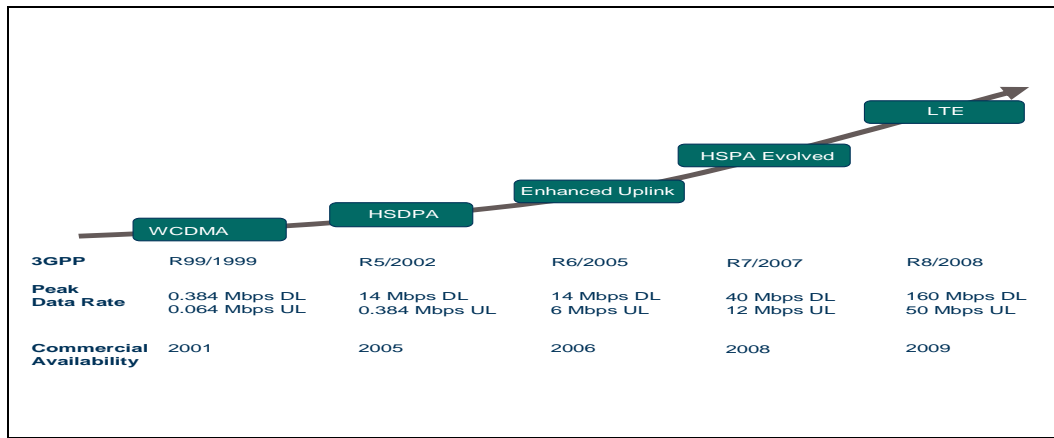
<sup>15</sup> See *More Than 100 3G HSDPA Commercial Networks Worldwide*. 4 Apr. 2007. 3G.co.uk. 18 May 2007 <<http://www.3g.co.uk/PR/April2007/4532.htm>>; see also Networks, HSPA Mobile Broadband Today. 2007. GSM Association. 18 May 2007 <<http://hspa.gsmworld.com/networks/default.asp>>.

<sup>16</sup> See Qualcomm CDMA Technologies, *3G Embedded Notebook Products: Industry Update*, at 8, attached to Letter from Dean R. Brenner, Vice President, Government Affairs, Qualcomm Inc., to Marlene Dortch, Secretary, FCC, ET Docket No. 03-137 (filed Apr. 20, 2007).

<sup>17</sup> See Figure 1, *infra*, part III.C.

### C. LTE

HSPA and HSPA-E were designed as part of a cost-effective migration path to LTE technology, the next progression in the evolution to 4G capabilities. LTE, defined in 2004 by 3GPP, combines flexible bandwidth with advanced antenna solutions, such as beam-forming and MIMO technology, to provide advanced capabilities more efficiently. LTE will provide very high data rates, reduced latency, high spectral efficiency, and spectrum flexibility. LTE's data rates increase as follows:



**Figure 1. Overview of the Time Line for 3GPP Releases**

Through the use of Adaptive Multi-Layer OFDM (“AML-OFDM”), LTE can produce super-high data rates that meet the ITU definition of 4G technology. For instance, Ericsson has demonstrated LTE at downlink speeds of 144 Mbps, which meets the bandwidth definition of a 4G technology.<sup>18</sup> AML-OFDM supports operations in different bandwidth sizes and provides very-high data rates in large bandwidths. Further, LTE benefits from multi-antenna techniques and multi-layer transmissions to provide parallel data stream transmissions to end-user terminals, which increases its efficiency. On the uplink side, LTE uses single-carrier FDMA to provide data rates of 50 Mbps.

<sup>18</sup> See Press Release, *Ericsson Demonstrates Live at 144 Mbps*, 9 Feb. 2007. Ericsson Inc. 18 May 2007. < <http://www.ericsson.com/ericsson/press/releases/20070209-1103814.shtml>>.

Due to its flexible nature, LTE offers an efficient network solution for many different operators. For example, LTE will be capable of operating in a wide range of different spectrum bands, including current and future spectrum, such as 700 MHz. Additionally, the technology operates efficiently in different spectrum allocations; it provides very-high data rates in 20 MHz spectrum blocks, and can be deployed in allocations of 5 MHz. Therefore, LTE is an attractive and suitable 4G solution for operators using both different channel sizes and different spectrum allocations.

#### **IV. HSPA AND ITS EVOLUTION TO LTE HAVE MANY COMPETITIVE ADVANTAGES.**

In its *Public Notice*, the Commission expressly inquired as to whether Internet access services using mobile WiMAX compete with mobile broadband services offered by carriers using 3G technologies.<sup>19</sup> Comparing radio technologies is never straightforward because every technology has its own unique characteristics, implementation, and timing. However, based on industry data, HSPA is well ahead of WiMAX in deployment and HSPA is on a more clearly-defined and easily-adopted evolution path, leading to LTE data speeds of 160 Mbps in the down link direction.<sup>20</sup>

##### **A. HSPA is Widely Commercially Deployed When Compared to WiMAX.**

HSPA is at least four years ahead of other mobile broadband technologies, such as WiMAX. HSPA is already well-standardized and has a significant economy of scale advantage because it is commercially operational in more than 100 networks. In contrast, Mobile WiMAX has been launched commercially on a limited basis.<sup>21</sup> This initial

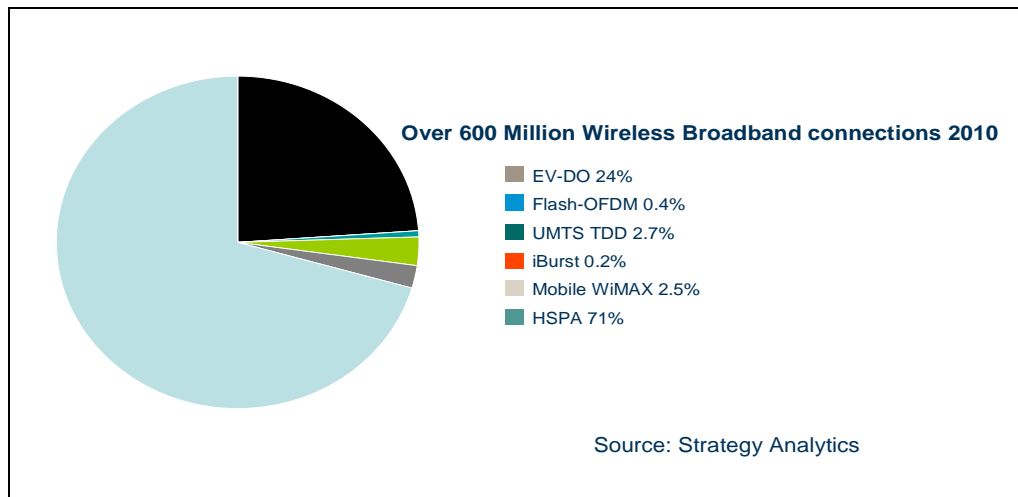
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<sup>19</sup> *Public Notice* at 10.

<sup>20</sup> See Figure 1, *infra*, part III.C.

<sup>21</sup> The WiMAX Forum reports that it "plans to have the TTA Lab operational in Q4 2006 to begin receiving mobile WiMAX equipment and start the test procedure validation process. It is expected that by Q1 2007, the first commercial mobile WiMAX products will achieve the designation of WiMAX Forum

strength of HSPA over mobile WiMAX is borne out in analyst predictions. HSPA is projected to achieve a 71% share of wireless broadband connections by 2010:



**Figure 2. Market Share for the Different Wireless Broadband Technologies**

**B. HSPA and LTE Have Operational and Cost Efficiencies.**

HSPA is operationally different than WiMAX in several ways that make it a more efficient technology. First, WiMAX is a single-service technology. For example, WiMAX operators will likely need to offer dual-mode devices so that subscribers can use the cellular network for voice services and access the WiMAX network for data services.

In contrast, HSPA uses a single network as a platform for multiple services and applications. Simultaneous voice and data service is a “critical advantage over other 3G technologies.”<sup>22</sup> HSPA devices also operate on GSM/GPRS or GSM/WCDMA platforms when an HSPA network is not available. Thus, HSPA employs a unified and flexible operational approach that reduces network costs due to its greater efficiencies.

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CertifiedTM, with deployment of networks to follow. Currently, the WiMAX Forum's members are in the final stages of defining system profiles of mobile WiMAX equipment...." See, [http://www.wimaxforum.org/news/pr/view?item\\_key=02bac231a27da057aa2523d0b4688346e3b24d74](http://www.wimaxforum.org/news/pr/view?item_key=02bac231a27da057aa2523d0b4688346e3b24d74)

<sup>22</sup> Comments of 3G Americas, WT Docket No. 07-71, at 9 (May 7, 2007).

For these reasons, HSPA devices will likely be more prolific and less expensive than mobile WiMAX devices.<sup>23</sup>

Second, HSPA provides more economic rural coverage than WiMAX. HSPA uses FDD technology, in which the uplink and downlink use separate frequency channels. WiMAX, on the other hand, uses TDD technology, in which the uplink and downlink share one frequency channel. One of the drawbacks of a TDD system is that this resource sharing causes discontinuous transmission and reception, which results in lower average power. Consequently, an operator needs significantly more sites to achieve the same coverage (assuming the same peak device output power, frequency, and data rate) when it deploys a TDD technology because the TDD system's lower average uplink power constrains coverage.

Because it is based on FDD technology, an HSPA system requires significantly fewer sites leading to less capital investment in equipment and sites to launch than a WiMAX system. In addition, in rural areas, HSPA's greater base station power (and six-sector antenna configurations relying on modular high-gain antennas) provides superior, cost-effective performance.<sup>24</sup> In short, HSPA's value advantage has been proven and it is a cost efficient technology.

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<sup>23</sup> HSPA already far surpasses WiMAX in equipment offerings. At least 250 HSDPA/HSPA products are already available, including mobile phones, PC cards, USB modems, laptops with embedded HSPA card, wireless routers and cameras. Over 315 models of HSPA terminals from 38 different vendors are on the market. In comparison, mobile WiMAX-enabled phones are expected in 2008, and equipment offerings may be limited because fewer WiMAX commercial services are available. *See Over 250 End User Devices Account for 100% Increase in HSDPA Broadband Wireless Access in 3 Months*. 10 Apr. 2007. Broadband Wireless Exchange Magazine. 18 May 2007 <<http://www.bbwexchange.com/pubs/2007/04/10/page2499-535495.asp>>.

<sup>24</sup> At a distance of over 45 miles from an HSPA network base station, Ericsson has measured data rates at 1.1 Mbps.

## **V. HSPA EQUIPMENT IS BEING DEPLOYED IN THE AWS SPECTRUM.**

The recent Advanced Wireless Services (“AWS”) auction of spectrum has already begun to impact competition in the CMRS market. The deployment of necessary equipment is well underway. For example, Ericsson has secured FCC certification of several base stations that use AWS spectrum.

In addition, T-Mobile has started its AWS spectrum deployment with 1200 cell sites in New York City. Using HSPA equipment, T-Mobile expects to provide broad 3G coverage within 18-24 months. T-Mobile selected HSPA technology for the build-out because it supports rich data applications and Internet access and mirrors the technology path T-Mobile followed in Europe.<sup>25</sup> These activities demonstrate that competition in AWS spectrum is proceeding without delay.

## **VI. CONCLUSION.**

The mobile broadband market has expanded significantly since the Commission published its *Eleventh CMRS Competition Report*. WCDMA and HSPA technology have fueled this growth. These technologies were designed to provide efficient, cost-effective 3G mobile broadband via seamless upgrades of existing GSM networks. They have delivered as promised. HSPA’s extensive deployment has created global economies of scale, which have significantly reduced the cost of HSPA build-outs and HSPA-capable equipment, and thereby enhanced the competitiveness of the wireless sector.

Further, the 3GPP technology family has also led to substantial consumer benefits in terms of the reach and availability of advanced services. Applications supporting enhanced data capabilities, video, and mobile broadband access services are mainstream,

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<sup>25</sup> See *FY 2006 Investor’s Day Investor Relations*, at 90. 1 Mar. 2007. Deutsche Telekom. 18 May 2007 <[http://www.download-telekom.de/dt/StaticPage/25/43/82/070301\\_fy\\_2006\\_presentation\\_254382.pdf](http://www.download-telekom.de/dt/StaticPage/25/43/82/070301_fy_2006_presentation_254382.pdf)>

and form the foundation of competition among carriers. EDGE, HSPA, and their progeny, HSPA-E and LTE, assure that in the coming years, consumers will enjoy even more enhanced services and at significantly higher data rates. Moreover, because the evolution path is well-defined and optimized for spectrum and deployment efficiency, network upgrades can be done easily and in a cost-effective manner. It is for these reasons that the GSM family of technologies will continue to drive vibrant competition in the U.S. CMRS marketplace.

Respectfully submitted this 22th day of May, 2007.

Barbara Baffer, Vice President, Public Affairs  
& Regulations  
Allison Ellis, Director Regulatory Policy  
Ericsson Inc  
1634 I Street NW, Suite 600  
Washington, D.C. 20006-4083  
Telephone: (202) 824-0102  
Facsimile: (202) 783-2206

Elisabeth H. Ross  
Birch, Horton, Bittner & Cherot  
1155 Connecticut Avenue, N.W.  
Suite 1200  
Washington, D.C. 20036  
Telephone: (202) 659-5800  
Facsimile: (202) 659-1027

## Appendix A

<b>3GPP:</b>	3rd Generation Partnership Project. 3GPP is a collaboration agreement between a number of telecommunications standards bodies. The original scope of the agreement was to develop globally applicable technical specifications and reports for 3rd generation technologies based on evolved GSM core networks and the radio access technologies they support.
<b>FDD:</b>	Frequency Division Duplexing.
<b>GSM:</b>	Global System for Mobile Communications.
<b>HSPA:</b>	High Speed Packet Access. An extension of WCDMA to provide high bandwidth and enhanced support for interactive, background and streaming services.
<b>HSPA-E:</b>	HSPA Evolved.
<b>LTE:</b>	Long Term Evolution.
<b>MIMO:</b>	Multiple Input Multiple Output.
<b>TDD:</b>	Time Division Duplexing.
<b>WCDMA:</b>	Wideband Code Division Multiple Access. WCDMA is a wideband spread-spectrum 3G mobile telecommunication air interface.
<b>WiMAX:</b>	World wide interoperability for Microwave Access. WiMAX is a standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL.